Propranolol
For Infantile Haemangioma
Newborn use only

2019

Alert	For infants with comorbidities that are likely to lead to hypoglycaemia (e.g. hyperinsulinism/preterm/low weight) and for cervico-facial segmental haemangioma – propranolol dose schedule needs to be cautious. Ensure that child is fed regularly to reduce the risk of hypoglycaemia. If feeding is reduced, propranolol needs to be stopped until the child is feeding normally.
Indication	1. Infantile haemangioma (IH) causing/likely to cause compromise or complications. 2. Cervico-facial segmental haemangioma (suspected PHACES syndrome)
Action	The exact mechanism of action is unclear. Suggested actions include pericyte-mediated vasoconstriction, inhibition of vasculogenesis, catecholamine-induced angiogenesis and downregulation of the renin–angiotensin–aldosterone axis.
Drug Type	Beta-adrenergic blocker
Trade Name	Deralin, Inderal tablets Propranolol suspension compounded by pharmacy department.
Presentation	Propranolol (Auspman) 2 mg/mL Propranolol suspension (formulas for multiple concentrations exist) compounded by Pharmacy Department.
Dosage / Interval	**<u>All IH except segmental haemangioma</u>** including facial segmental haemangioma: **<u>Term birth/normal weight/No comorbidities:</u>** Refer to monitoring section prior to the commencement. Starting dose: 1 mg/kg daily in 2–3 divided doses. Maintenance dose: 2 mg/kg daily in 2–3 divided doses. Minimum time interval between dose increases: 24 h **<u>Preterm/low birthweight/comorbidities:</u>** Refer to monitoring section prior to the commencement. Starting dose: 0.5 mg/kg daily in 2–3 divided doses. Maintenance dose: 2 mg/kg daily in 2–3 divided doses. Minimum time interval between dose increases: 24 h **<u>Facial segmental haemangioma</u>** (suspected PHACES syndrome) Refer to monitoring section prior to the commencement. Starting dose: 0.5 mg/kg daily in **3** divided doses. Refer to evidence summary section for further management. **<u>Treatment duration</u>** In many cases, treatment can be stopped at 1 year of age and the majority of patients with IH do not need treatment beyond 17 months of age. It is safe to stop propranolol abruptly (rather than weaning patients off treatment gradually) during or at the end of therapy.
Maximum daily dose	3 mg/kg/day in unresponsive cases.
Route	Oral
Preparation/Dilution	Propranolol (Auspman) 2 mg/mL
Administration	If using suspension compounded by Pharmacy, shake well before measuring dose. To reduce the risk of hypoglycaemia, administer orally during or immediately after a feed.
Monitoring	<u>Prior to commencement of therapy</u> • Cardiovascular and respiratory examination by a competent practitioner is required before starting propranolol (auscultation, peripheral pulses, abdominal examination for potential liver enlargement) • Pre-treatment ECHO needed in selected cases (e.g. segmental haemangioma) • Pre-treatment ECG needed in selected cases (e.g. cardiac arrhythmias, segmental haemangioma)

	• Unless otherwise indicated, routine pre-treatment FBC, renal, liver and thyroid profiles are not required before starting propranolol. • Baseline glucose is only required in selected cases (e.g. infants with hypoglycaemia, IV propranolol) • Paediatric cardiology assessment in selected cases. • Patients younger than 4 weeks of age, who are preterm, with faltering growth, feeding difficulties and/or significant comorbidities, such as hyperinsulinism, previous episodes of hypoglycaemia, respiratory, cardiac, metabolic or neurological disorders, require admission for 2–4 h on initiation and for dose increments >0.5 mg/kg daily: HR and BP measurements should be done immediately before the first dose and then every 30 min for 2–4 h after the first dose. • Blood glucose needs to be checked only in patients at risk of hypoglycaemia. <u>After first dose</u> • Post-first dose monitoring not routinely needed. • Where observation needed (HR and BP), there should be 30 min between observations. • Total length of observation 2–4 hours. • Glucose to be checked only in patients at risk of hypoglycaemia (preterm, low weight, intercurrent illness, faltering growth, neonates, history of hypoglycaemia). • Bradycardia: Newborns (<1 month old) <70 beats per minute; infants (1–12 months old) <80 beats per minute. <u>During treatment</u> • Routine follow-up for a patient on a stable treatment dose, without complications, should be at intervals of 2–3 months. • BP and HR do not need to be monitored between appointments if the infant is well. <u>Stopping propranolol</u> A. Temporary cessation required if: 1. Significantly reduced oral intake of feeds (due to risk of hypoglycaemia) 2. Wheezing requiring treatment.
Contraindications	Relative Frequent wheezing Blood pressure outside normal range for age – treatment in conjunction with neonatologist/paediatrician/dermatologist HR outside normal range for age or cardiac arrhythmias – treat in conjunction with neonatologist/paediatrician/dermatologist Absolute Hypoglycaemic episodes, recent or ongoing Heart block, second and third degree Hypersensitivity to propranolol
Precautions	Infants with comorbidities that are likely to lead to hypoglycaemia – intercurrent illness, preterm, low birthweight, infants at risk of hypoglycaemia. Segmental haemangioma including PHACES syndrome (posterior fossa malformations–haemangioma–arterial anomalies–cardiac defects–eye abnormalities–sternal cleft and supraumbilical raphe) – may increase the haemodynamic risks associated with an otherwise asymptomatic cerebral arteriopathy. Hyperthyroidism — beta-blockers may mask clinical signs, e.g. tachycardia. Phaeochromocytomas — beta-blockers may aggravate hypertension; an alpha-blocker should be given first. Beta-blockers may reduce the response to usual doses of adrenaline (epinephrine) for anaphylaxis. Myasthenia symptoms – may worsen.

	Beta-blockers may worsen first-degree AV block. Beta-blockers may impair peripheral circulation and exacerbate symptoms of peripheral arterial disease (PAD). Beta-blockers may mask important signs of acute hypoglycaemia (e.g. tachycardia, tremor). They may also increase the incidence and severity of hypoglycaemia but data are conflicting. Can precipitate bronchospasm.
Drug Interactions	β-Blockers and cholinomimetics (e.g. neostigmine) cause bradycardia, AV block and hypotension via their synergistic negative chronotropic effect. Propranolol and digoxin cause bradycardia and AV block via their additive effect. Propranolol may prolong the hypoglycaemic effects of insulin and mask the signs of hypoglycaemia. Prostaglandin synthetase inhibiting drugs (e.g. ibuprofen and indomethacin) may decrease the hypotensive effects of β-blockers Decrease blood levels/decrease efficacy with rifampin, ethanol, phenytoin, and phenobarbital.
Adverse Reactions	May cause transient worsening of heart failure symptoms (e.g. in too fast up-titration). The manifestations of β-blocker overdose include bradycardia, atrioventricular (AV) blockade, hypotension, left ventricular failure and cardiogenic shock. Common (>1%) adverse reactions include bradycardia, hypotension, orthostatic hypotension, transient worsening of heart failure (when treatment starts), nausea, diarrhoea, bronchospasm, dyspnoea, cold extremities, exacerbation of Raynaud's phenomenon, fatigue, dizziness, abnormal vision, alteration of glucose and lipid metabolism.
Compatibility	
Incompatibility	
Stability	Auspman propranolol unopened bottle: 2-year shelf life.
Storage	Do not freeze. Protect from light. Auspman preparation: Store below 30°C. Compounded suspension from Pharmacy Department: Refrigerate or store according to instructions on bottle.
Special Comments	Initiation of treatment is recommended after stabilisation of heart failure symptoms. Avoid too fast up titration.
Evidence summary	Refer to full version.
References	Refer to full version.

Original version Date: 28/03/2019	**Author: ANMF Consensus Group**
Current Version number: 1	**Current Version Date:** 28/03/2019
Risk Rating: Low	**Due for Review:** 28/03/2024
Approval by: As per Local policy	**Approval Date:**

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